The FCC's spectrum allocation decisions created 102 MTA-sized licenses. Because three of these licenses were earlier awarded to PCS applicants, only 99 broadband MTA licenses were sold.[4] By allocating PCS spectrum in a large number of distinct geographic markets, the FCC created licenses with substantially different demographic characteristics. Table 1.0 depicts the wide variation in population density and per capita income in the 99 MTA licenses at auction.[5] These density and income differences translate into different profit potentials for the corresponding markets and, thus, different valuations for the associated licenses.

---

[4] The three licenses referred to in the text were awarded to separate applicants who, in the FCC's judgment, made unique technical contributions to the development of PCS service. One license for each of the Los Angeles, New York, and Washington, D.C. MTAs was awarded in this fashion. The awardees paid a total of $704 million for their licenses, approximately $396 million less than the auction winners paid for similar licenses.

[5] Density may have been an especially important consideration in bidder valuations of licenses because of the facilities build-out requirements imposed by the FCC. Each 30 MHz broadband licensee is required to construct facilities that provide coverage to one-third of the population in each of its MTAs within five years of the initial license grant, and two-thirds of the population within ten years. See 47 C.F.R. § 24.203(a)(1994). Presumably, the costs of constructing a network serving a given number of people scattered throughout an area are greater than one serving the same number of people concentrated in a smaller area. Basing build-out requirements on the percent of population served, therefore, may have led to lower prices for sparsely populated MTAs. For example, despite its slightly larger population, the Spokane-Billings MTA sold for roughly one-third the price of the more densely populated Nashville MTA.

Table 1.0

MTA Demographics

	Mean	Minimum	Maximum	Std. Deviation
Density (Population/sq.mile)	132	9.41	464	111.84
Per Capita Income ($)	15,020	11,519	19,583	1,732

The heterogeneity of available licenses was compounded by the fact that some bidders were not acquiring "clear" spectrum. The frequencies allocated to PCS are currently used by private and common carrier providers of fixed microwave services, which are not uniformly distributed across either geographic areas and/or spectrum blocks. Moreover, the FCC's plan for relocating fixed microwave licensees appears to afford them substantial bargaining power over PCS auction winners concerning the terms and conditions of their relocation.[6] The existence of incumbent fixed microwave licensees and their ability to extract payment from some PCS licensees enhanced the heterogeneous nature of the PCS licenses.

---

[6] The FCC has recently proposed changes to its relocation plan that may reduce the bargaining power of fixed microwave users. See Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation (NPRM) WT Docket No. 95-

B. Expected PCS-Type Services

It was also expected that the FCC's broad definition of PCS would attract a wide variety of bidders, including long distance and local telephone service providers, cable television companies, and electric utility companies. Some of these bidders were expected to use PCS licenses to provide different services.[7] To long distance service providers and cable companies, PCS licenses may be best used to provide "access service," while a local telephone service company may use it to provide a wireless service that competes with incumbent cellular telephone providers. Because of differences in use, the valuations these bidders placed on licenses may have varied substantially.

C. Broadband PCS License Valuations

Bidders' desires to acquire multiple licenses were expected to be enhanced, in part, by the existence of "license value synergies." Specifically, the value a bidder placed on a collection of MTA licenses may have been, in some instances, greater than the sum of its valuations for the

---

[7] More technically, the bidders that participated in the auction appeared to exhibit "bidder asymmetry." Bidder asymmetry exists when bidders obtain their valuations from different probability distributions. This occurs when, for instance, bidders plan to use the items up for auction in different ways.

Bidder asymmetry can also occur if bidders are differentially "budget constrained" in that they could not afford to acquire all the license they desired at prevailing prices. It appears that because of imperfections in the capital markets, some bidders experienced a binding budget constraint for a number of their desired licenses.

individual component licenses.[8] It was also expected that bidders would be uncertain about the true value of the licenses up for auction. Bidders' license valuations, therefore, had a "common value" component. In a common value environment, bidders obtain information signals (e.g., cost and demand studies) regarding the true value of the auctioned item. These information signals may generate bids that are distributed around the true value of the item. The common value component of the bidding environment raised the possibility of the "winner's curse," which occurs when bidders that receive high value information signals do not appropriately discount their bids relative to these signals. Unless this discount is applied, bidders that receive high value signals will consistently win the auction by bidding more than the true value of the item.

Because of the uncertainties bidders were expected to face in the broadband PCS auction, the auction rules had to be carefully constructed to afford the participants flexibility in developing their bids and executing their bidding strategies. Each bidder benefitted from the value information contained in the bids submitted by rival bidders. As bidders received such information, they needed sufficient flexibility to implement their bidding strategies, consistent with the FCC's need to move the auction towards its conclusion. The remainder of this paper examines whether the FCC's broadband PCS auction rules gave bidders that flexibility and, if not, its effect on the prices winning bidders paid for their licenses.

---

[8] License synergies are due, in part, to the value wireless users place on being able to "roam" from one license area to another.

IV. The Broadband PCS Auction Rules

To reduce concerns about the winner's curse, the FCC selected an "iterative" auction, in which a bidder has the opportunity to adjust its own license value estimate based upon the bids submitted by its rivals. The bidders' interest in acquiring multiple licenses induced the FCC to employ an iterative simultaneous, rather than a sequential auction. In a sequential auction, licenses are auctioned according to a pre-determined order. In a simultaneous auction, all licenses are put up for sale at the same time, thereby allowing bidders to shift their bidding attention in response to a change in the rank order of the "net profits" (i.e., the difference between the value a bidder placed on a license and that license's final sales price) obtained from acquiring different licenses.[9] As suggested by the theoretical arguments and experimental evidence presented by NTIA and others, a simultaneous auction is likely to be superior to a sequential auction in providing bidders information about the eventual sales prices of the auctioned items. This additional information often leads to a more efficient assignment of licenses.[10]

---

[9] "Rank ordering" is a method of arranging a set of objects (e.g., PCS licenses, academic institutions) according to some variable (e.g., net profits, scholarly reputation).

[10] Economic experiments sponsored by NTIA and conducted by Caltech indicate that the existence of synergies in license valuation poses a problem for a conventional simultaneous auction. The extent of this problem depends upon the size of the synergy value, the extent to which bidder license preferences partially overlap, and the number of bidders competing for these preference-overlapped licenses. A conventional simultaneous auction exposes a bidder with valuation synergies to financial risk because it must make a decision -- with limited information -- regarding the manner in which it should assign synergy values to a set of independent auctions. Because of this risk, this auction may lead to an inefficient assignment of licenses. One method of solving this assignment problem is to employ a simultaneous auction that permits bidders to submit bids on both license packages and individual licenses. Existing experimental evidence indicates that this "combinatorial" auction is often superior to the standard simultaneous auction in terms of assignment efficiency and revenue generation. (See Bykowsky, Mark M., Robert J.

To permit bidders to respond to bid price information throughout the auction, the FCC decided to close the auction when no new acceptable bid was placed on any license (i.e, they adopted a simultaneous stopping rule). The use of this rule raised the issue of how best to control the speed with which the auction progressed. In the broadband PCS auction, bidders benefitted from knowing their rivals' bidding strategies and license value estimates as reflected in their bids. Consequently, bidders had the incentive to limit their bidding activity and simply observe their rivals' bids. If left unchecked, this behavior would have caused the auction to continue for an unacceptable period of time. The FCC adopted so-called "eligibility" or "activity rules" to induce bidders to increase their bidding activity. A bidder's eligibility in a round was determined by the size of its up-front deposit, the number of licenses included in its pre-auction application list, and the level of its bidding activity in the previous rounds.

Cull, and John O. Ledyard (1995), " Mutually Destructive Bidding: The FCC Auction Design Problem," California Institute of Technology, Social Science Working Paper #916).

The FCC, however, chose to conduct a simultaneous non-combinatorial auction: "We concluded that simultaneous multiple round auctions offer many of the same advantages [as combinatorial] without the same degree of administrative and operational complexity." Fifth Report and Order, 9 FCC Rcd. 5532, 5546, ¶35 (Fifth Report and Order). Perhaps recognizing, however, that a non-combinatorial auction may expose bidders to financial risk, or that bidders may simply make mistakes, the FCC permitted bidders to withdraw a standing high bid. A withdrawal obligated the bidder to pay the difference between its withdrawn bid and the license's final sales price, if the latter was less than the former. Of the twenty withdrawn bids in the broadband PCS (MTA) auction, eight resulted in penalties. Total penalties amounted to over $23 million, an amount approximately equal to the winning bid for a broadband PCS license in Kansas City. (See Salant, "Up in the Air," Attachment).

The up-front payment determined the maximum number of "POPs" (i.e., population) for which a bidder was eligible to bid in any given round. This payment was based upon a standard formula of $.60 per POP. For example, an up-front payment of $100 million would permit a bidder to bid on as many as 166,666,667 POPs in a given round. In addition, the FCC required that each bidder identify, prior to the auction, the MTAs for which it wanted the option to bid. The total number of POPs represented by MTAs included in this list could, however, exceed the bidder's total initial eligibility as determined by its up-front payment. The FCC made each bidder's license application list publicly available.[11]

The FCC adopted a three-stage eligibility rule, with each successive stage imposing a more stringent bidding constraint on the bidder. In Stage I, bidders were required to be active on one third of the POPs for which they wished to retain eligibility. For eligibility purposes, a bidder was considered "active" on a license in a given round if it had the highest standing bid from the previous round, or had submitted a bid that exceeded the previous round's high bid on a license for which it was not the high bidder.[12] A bidder's failure to remain active in round n+1 on a pre-determined fraction of those licenses for which it was eligible to bid (after round n) resulted in a reduction in eligibility in round n+2. For example, in Stage II bidders were required to be active on two thirds of the POPs for which they wished to retain eligibility. Therefore, a movement

---

[11] Fifth Report and Order, at 5554.

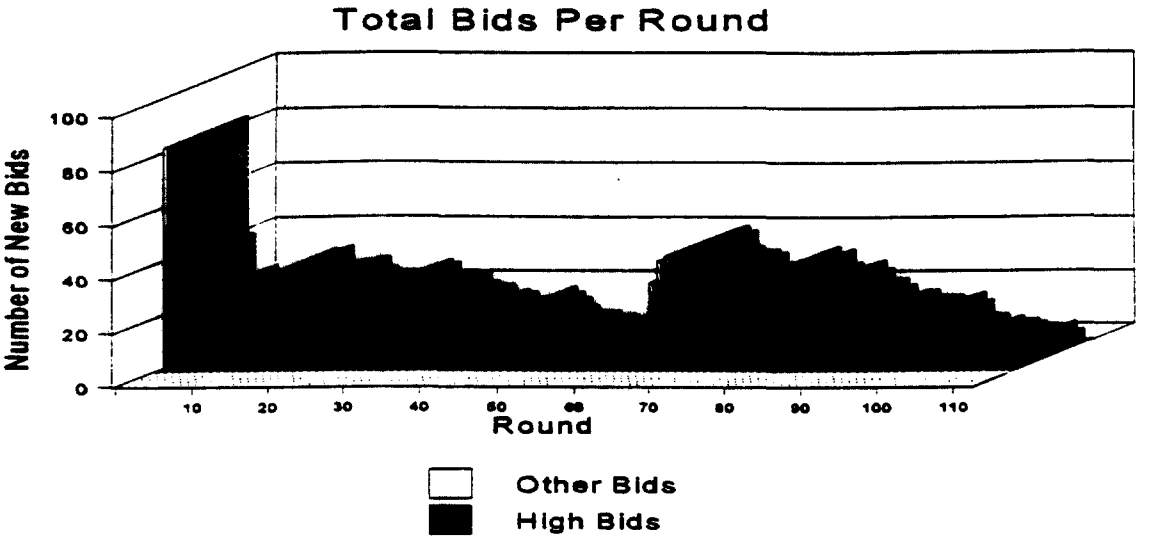
[12] This bid must exceed the previous high bid by an amount equal to or greater than the bid increment.

from Stage I to Stage II required bidders to begin bidding on additional licenses in order to maintain their Stage I level of eligibility. Finally, in Stage III, bidders had to remain active on 100 percent of the POPs for which they wished to retain eligibility.[13]

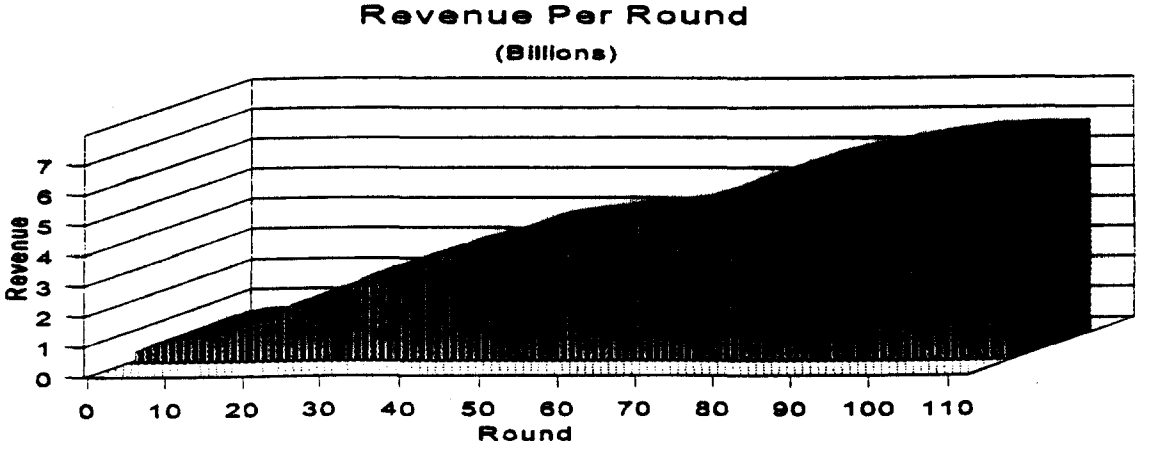
The bidding data generated by the broadband PCS auction demonstrates the effect of the FCC's eligibility rule. The use of a successively more exacting eligibility rule should cause an initial increase in bidding activity at the start of each new stage. The decline in bidding activity following the initiation of a new stage is likely the result of numerous factors. A bidder's incentive to observe the bids of its rivals, while at the same time revealing as little as possible about the valuations it places on licenses, suggests that bidding activity would diminish during each stage. In addition, in the latter phases of the auction, bidding activity and incremental auction revenues will decline as bidders drop out of the auction in response to bids that exceed their willingness-to-pay for specific licenses. The bidding and total revenue data shown in Graphs 1.0 and 2.0, respectively, are consistent with these conjectures. Graph 1.0 demonstrates the stimulative effect of moving to a higher stage, while Graph 2.0 confirms the eventual decrease in bidding activity as measured by the decline in incremental auction revenue within each stage. Stage II began in round 12, Stage III in round 65.

---

[13] The FCC also assigned bidders five bidding "waivers." A waiver enabled the bidder to maintain its level of eligibility from the previous round, regardless of its level of bidding activity in that round.



Graph 1.0



Graph 2.0

IV. Bidding Strategy

In the broadband PCS auction, each bidder attempted to obtain that set of licenses that maximized its profits, given the final sales prices and its budget constraint. This required that each bidder attempt to maximize the sum of the "net profits" associated with its collection of preferred licenses. As the auction progressed, bids submitted in each round created a net profit path for each license. At some point in the auction, each bidder would maximize its expected net profits by bidding on those licences with the highest net profits.[14] During the auction, the net profit paths for some licenses likely crossed, perhaps inducing a budget constrained bidder to shift its bidding attention to licenses with higher expected net profit paths.

In Stage III, however, the FCC's bidding eligibility rules made it difficult for such bidders to switch between licenses, and thus may have affected final sales prices. Consider the following example. Suppose a bidder placed the same value on two licenses (X and Y) and that its budget constraint precluded it from obtaining both licenses. To maximize its profits, the bidder wanted to obtain the license with the lowest final sales price. Further, suppose that the service area corresponding to License X had a population of 10 million, while License Y's

---

[14] Numerous bidding strategies were available for bidders. It is quite possible that, at certain points in the auction, a part of one's optimal strategy was not to bid on those licenses for which existing net profits were the highest. For example, it may have made sense for a bidder to drive up prices on other bidders' preferred licenses in an attempt to exhaust their resources, and thus prevent them from later bidding on its preferred licenses.

service area population was 9.5 million. During Stage III, the bidder's decision to bid on License Y would, because of the 100 percent bidder activity rule, preclude it from bidding further on License X.[15]

The inability of bidders to predict correctly the final sales prices of licenses may have caused the bidding for some licenses for highly populated areas to close earlier than licenses for lower to moderately populated areas.[16] While, technically speaking, the auction closed for all broadband PCS licenses simultaneously, evidence indicates that the bidding for some licenses stopped much earlier than for other licenses. Table 2.0 shows the average round in which licenses reached their final sales prices by market size.

---

[15] A constraint on bidding flexibility will not effect the auction's outcome if bidders are able to predict accurately before the onset of Stage III the final relative positions of the net profit paths of their preferred licenses. Whether bidders in the broadband PCS auction were able to make such predictions is an issue that is difficult to analyze empirically. It is reasonable to assume, however, given the complexities of the broadband PCS auction, that some bidders may have made some prediction errors.

[16] The strength of the inverse relationship between the round in which a license's auction effectively closed and the license's population depends, in part, upon the ability of bidders to maintain eligibility. For instance, a bidder could attempt to maintain its bidding eligibility by bidding on more licenses than it could afford to acquire. In the current example, the bidder could bid on a third license -- License Z -- with a total population of one half million. The adoption of this strategy by numerous bidders would reduce the strength of the inverse relationship between the market size of a license and the round in which it effectively closed.

Table 2.0 Auction Close by Market Rank		
Market Rank	Average Population	Average Final Round
1-12	11,042,500	72.5 (80.9)*
13-25	4,861,490	87.7 (87.7)*
26-37	3,182,020	93.8 (93.8)*
38-51	1,762,810	88.7 (91.0)*
( )* Excludes licenses that reached their final sales prices by round forty		

Table 2.0 indicates that, on average, licenses for the twelve most populated MTAs reached their final sales prices approximately 15 rounds earlier than did licenses for the next thirteen most populated MTAs. If we exclude those licenses that reached their final sales prices before round 40 -- well before the onset of Stage III -- the top twelve MTA licenses reached their final sales prices seven rounds prior to the next thirteen ranked licenses and roughly twelve rounds prior to the close of bidding for licenses ranked in the bottom half by population.

Bidders that lost eligibility to bid on highly populated service areas because they overestimated these licenses' final sales prices, may have initiated, depending on their license preferences, bidding on licenses with less populated service areas. The "early" closure of large licenses, therefore, may have caused bidding competition to cascade downward to less populated MTAs. In a recent paper, Dr. David Salant, a former member of GTE's bidding

team, suggested that this may have occurred:

> "As prices rise, eligibility reductions need to be managed to maintain the greatest [bidding] flexibility. . . . Maintaining maximum flexibility requires that bidding on groups of properties be in a sequence that depends on the size of the markets and their valuations. Of particular concern is that back-up options always result in smaller-sized blocks than the primary options during Stage III. . . .It becomes difficult to enter new markets in Stage III, unless a bidder's standing high bids [sic] in one round gets topped in subsequent rounds. On the other hand, switching too early could mean jeopardizing chances at winning primary targets, overpaying, or giving up prematurely on licenses that might have turned out to be the best deals."[17]

Bidders' incentives to maintain eligibility during the auction may have had other price effects. Auction observers have suggested that signaling of preferred licenses may have disadvantaged those parties interested in acquiring only a limited set.[18] As alluded to above, eligibility was tied to a bidder's expressed willingness to become the high bidder for licenses. A bidder could conceivably preserve eligibility (and thus future bidding options) by bidding for more licenses than it desired or could afford. A bidder that adopted such a strategy, however, ran the risk of obtaining licenses it would rather not have owned.[19] This risk could be mitigated if a bidder was fairly certain that some other bidder would eventually win the license.

---

[17] Salant, "Up in the Air," at 18-19.

[18] See, e.g., Salant, "Up in the Air," at 28.

[19] Recall, however, that bidders could withdraw a current high standing bid at a penalty.

By limiting its interest to a few populated MTAs, Bidder A may have unwittingly signaled to Bidder B that B could bid for A's preferred property, retain eligibility to compete for its (B's) desired licenses, and yet run little risk of winning a license (B) it did not truly desire. In effect, MTAs clearly targeted by one bidder may have become reservoirs of "low-risk" eligibility for other bidders. In the process, bidders seeking sources of bidding eligibility likely increased the prices that limited interest bidders had to pay for their desired licenses. Apparently, GTE's bidding team felt that a number of bidders satisfied this limited interest criterion:

> "Western PCS, BellSouth, Ameritech, and PacTel, as well as Powertel, all had very limited interests. The fact that they restricted themselves to bidding on a few significant markets might have made their bidding behavior a bit more predictable. . . . Some of the RBOCs could have chosen a more diversified strategy when filing their applications and during the earlier stages of the bidding; this would have made assessing the competition more difficult for their rivals. PacTel might have made a costly mistake in trumpeting their intentions to win LA at any cost. Although the purpose was to discourage rivals from competing there, it probably allowed Craig McCaw and ALAACR to risk more money there than he otherwise would have."[20]

VI. Empirical Test of the Auction Rules

A. Methodology

The hypotheses stated in Section IV predict systematic differences in the prices some bidders paid for their PCS licenses. To this end, we estimate a statistical relationship that attempts to explain variations in the final sales prices of broadband PCS licenses. The

---

[20] Salant, "Up in the Air," at 28.

dependent variable is the final auction price of the license (*price*). Independent variables that control for relevant features of the respective MTA markets include: per capita income (*pcap*)[21], the percentage change in MTA population from 1990-1994 (*popchng*), and MTA population per square mile (*density*). All else equal, we expect the dependent variables to be positively related to each of these independent variables.

We include two additional independent variables to measure the hypothesized effects of specific rules on auction outcomes. The first of these "institutional" variables attempts to measure the effect of the FCC's bidder eligibility rules. As described in Section IV, this rule may have caused the bidding activity on licenses for large service area populations to, in effect, close earlier than licenses with smaller service area populations. To test whether the early close of licenses for areas with large populations had any effect on auction prices, we include the round in which each license reached its final price (*close*) as an independent variable. Holding other factors constant, we expect that the restrictive activity rules in the third stage may have caused licenses that closed late to sell at higher prices.

---

[21] In some specifications we included the total "effective buying income" (*ebi*) of all residents of an MTA in place of *pcap*. The *ebi* measure is defined by Rand McNally as gross personal income less personal taxes and non-tax payments (such as fines, fees and penalties). *ebi* also excludes compensation made to military and diplomatic personnel stationed overseas. Rand McNally, Commercial Atlas and Marketing Guide, 1995.

The second institutional independent variable is a dummy variable that indicates whether the eventual licensee had pre-specified an interest in acquiring a geographically limited set of licenses (*limited*). One entity's very name -- PhillieCo -- signaled its intention to focus its bidding on one particular MTA. In other cases, specifying our limited interest dummy variable was tricky. While some entities like PacTel focused attention on only two MTAs (i.e., San Francisco and Los Angeles), others like Western PCS showed interest in a wide variety of Western MTAs, eventually winning licenses in six (i.e., Portland, Des Moines, Salt Lake City, El Paso-Albuquerque, Oklahoma City, and Honolulu). Based on their applications, bidding behavior, and Salant's remarks, we chose the most clear-cut cases of limited interest. These cases are shown in Table 3.0.[22]

Table 3.0
Cases of Limited Interest

BIDDER	MARKET(S)
Ameritech	Cleveland, Indianapolis
PacTel	Los Angeles, San Francisco
PhillieCo	Philadelphia
Powertel	Atlanta, Birmingham, New Orleans, Memphis-Jackson, Jacksonville

[22] We tried other variations of the limited interest variable using subsets of the four firms listed in table 3. The qualitative results remain largely unchanged as a result of these substitutions.

If some bidders did attract bidding competition by providing low-risk eligibility to others, we would expect that, holding other factors constant, the prices in each of the "limited interest" markets would be higher than those in other markets.

B. Results

Table 4.0 presents regression results for two double-logged models that use *price* as the dependent variable. Model #1 was estimated using Ordinary Least Squares, while Model #2 was estimated using a procedure that corrects for heteroskedasticity.[23] Both models were estimated using Block B price data taken from 47 observations.[24] The model's overall fit, as measured by the adjusted R^2, is .87. The signs of the coefficients for all of the independent variables are positive, as expected. With the exception of the per capita income variable, the statistical significance of the coefficients exceeds conventional levels of acceptance.[25]

---

[23] Heteroskedasticity occurs when the residual term's variance-covariance matrix possesses non-identical diagonal elements. To test for heteroskedasticity, we employed the Glejser test which regresses the absolute value of the least squares residual term on each of the model's independent variables. This test indicated a statistically significant inverse relationship between the MTA's population density and the variance of the residual term. White's Estimator was used to provide more efficient parameter estimates. See Halbert White, "A Heteroskedastic Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity," 48 Econometrica (1980) 817-838..

[24] The data set excludes prices from the MTAs located in Guam-Northern Mariana Islands, Puerto Rico-U.S. Virgin Islands, American Samoa, and Alaska.

[25] The substitution of effective buying income (*ebi*) for per capita income (*pcap*) yields the same qualitative relationships. Furthermore, similar qualitative results obtain when we substitute Log (*price/pop*) for Log(*price*) as the dependent variable.

The coefficient on *close* indicates that each additional round of bidding cost the eventual winner of a license some $ 712,000.[26] Because many of the licenses for smaller MTAs closed roughly fifteen rounds after typical large market MTAs, the estimated impact of a late close was in the neighborhood of $10.7 million. To the extent that late closes on small market licenses were the result of the FCC's Stage III activity rule, the rule may have caused winners of smaller MTAs to pay more for their licenses than did winners of large markets (holding other relevant factors constant). The coefficient on *limited* in Model 1 implies that, for those MTAs in which the eventual winner had indicated a limited bidding focus, prices increased some $20.8 million. Accordingly, bidders with an interest in only a handful of relatively well populated MTAs may have been negatively affected.

---

[26] Because the relationship between price and the underlying independent variables is non-linear, this estimate requires an assumption about the level of the independent variables. Specifically, the estimate was evaluated at the mean values for the continuous independent variables, and with the *limited* dummy variable taking on the value of zero.

Table 4.0 Regression Results		
Independent Variables	**Model #1 - OLS** **Dep. Variable - Log Price**	**Model #2 - White Estimator** **Dep. Variable - Log Price**
Constant	-11.521 (1.96)	-11.521 (2.50)
Log *Density*	.266 (3.29)	.266 (3.05)
Log *Pcap*	.718 (1.09)	.718 (1.26)
Log *Pop*	1.130 (10.76)	1.130 (12.30)
Log *Popchg*	.154 (2.76)	.154 (3.79)
Log *Close*	.820 (3.81)	.820 (2.94)
Limited	.247 (1.58)	.247 (2.08)
Observations	47	47
Adjusted R^2	.87	.87
(t-values are in parentheses)		

VI. Conclusions

The FCC did a commendable job in devising and conducting auctions for the two 30 MHz broadband PCS licenses in each MTA. The success of the broadband PCS auction, however, does not mean that the FCC's auction rules can not be improved upon in subsequent auctions. Our analysis leads us to advocate that the FCC alter its Stage III eligibility requirements. Holding other factors constant, prices paid for late-closing small-market MTAs were higher than for large-market MTAs. To the extent that the later close of bidding for less-populated MTA's was due to the Stage III rules, making the rules less stringent would reduce this undesirable price effect. For example, the FCC may wish to require bidders to be active on only 90 percent of pops in Stage III. In addition, our research indicates that by signaling their interest in only a limited number of MTAs, some bidders may have paid relatively higher prices for their licenses. Under an activity rule that is based on pops, however, it is less clear what the FCC can do to improve the situation.

While our discussion has focused on the recently completed broadband PCS auction, the results of our analysis extend to other spectrum auctions, provided that three bidding conditions are satisfied. First, the auction must involve the sale of multiple licenses. Second, some bidders must desire more than one license. Third, some bidders must be budget constrained in that they are unable to obtain all the licenses they desire at prevailing prices. Because it is expected that all three of these conditions will be satisfied in many future FCC auctions, including the auction involving the sale of licenses in the 220-222 MHz band, our observations should also apply to those auctions.

CERTIFICATE OF SERVICE

I, Patricia Volpe, do hereby certify that I have, on this 15th day of April, 1996, sent copies of the foregoing Reply Comments regarding the Implementation of Section 309(j) of the Communications Act -- Competitive Bidding, 220-222 MHz in PP Docket No. 93-253 via hand delivery (*) or by United States mail, first-class postage prepaid, to those parties appearing on the following three (3) pages.

Patricia Volpe

Patricia Volpe

* Chairman Reed Hundt
Federal Communications Commission
1919 M Street, N.W.,
Room 814
Washington, D.C. 20554

* Commissioner James Quello
Federal Communications Commission
1919 M Street, N.W.,
Room 802
Washington, D.C. 20554

* Commissioner Andrew Barrett
Federal Communications Commission
1919 M Street, N.W.,
Room 826
Washington, D.C. 20554

* Commissioner Susan Ness
Federal Communications Commission
1919 M Street, N.W.,
Room 832
Washington, D.C. 20554

* Commissioner Rachelle Chong
Federal Communications Commission
1919 M Street, N.W.,
Room 844
Washington, D.C. 20554

* John Cimko, Jr., Chief
Policy Division
Wireless Telecommunications Bureau
Federal Communications Commission
1919 M Street, N.W.
Room 664
Washington, D.C. 20554

* Michele C. Farquhar, Acting Chief
Wireless Telecommunications Bureau
Federal Communications Commission
2025 M Street, N.W.
Room 5002
Washington, D.C. 20554

* Rosalind Allen
Associate Bureau Chief
Federal Communications Commission
2025 M Street, N.W.
Room 5002-E
Washington, D.C. 20554

* Karen Brinkman
Associate Bureau Chief
Federal Communications Commission
2025 M Street, N.W.
Room 5002-E
Washington, D.C. 20554

* Ralph Haller
Deputy Chief
Wireless Division
Federal Communications Commission
2025 M Street, N.W.
Room 5002-B
Washington, D.C. 20554

* Martin D. Liebman
Policy Division
Wireless Telecommunictions Commission
Federal Communications Commission
2025 M Street, N.W.
Room 5002
Washington, D.C. 20554

Elizabeth R. Sachs, Esq.
Lukas, McGowan, Nace & Guitierrez
Counsel for American Mobile
Telecommunications Associates, Inc.
1111 19th Street, N.W.
Suite 1200
Washington, D.C. 20036

Russell H. Fox
Gardner, Carton & Douglas
1301 K Street, N.W.
Suite 900, East Tower
Washington, D.C. 20005

Richard L. Vega, Jr.
President
The Richard L. Vega Group
235 Hunt Club Boulevard
Longwood, Florida 32779

Dennis C. Brown
Brown and Schwaninger
1835 K Street, N.W.
Suite 650
Washington, D.C. 20006

William J. Franklin
Attorney for Roamer One, Inc.
Law Offices of William J. Franklin
1919 Pennsylvania Ave., N.W.
Suite 300
Washington, D.C. 20006-3404

David J. Kaufman, Esq.
Scott C. Cinnamon, Esq.
Brown Nietert & Kaufman, Chtd.
1920 N Street, N.W.
Suite 660
Washington, D.C. 20036

Mark J. Golden
Vice President, Industry Affairs
Personal Communications Industry
Association
1019 19th Street, N.W.
Suite 1100
Washington, D.C. 20036

Alan S. Tilles, Esq.
David E. Weisman, Esq.
Meyer, Faller, Weisman and
Rosenberg, P.C.
4400 Jennifer Street, N.W.
Suite 380
Washington, D.C. 20015

Robert A. Fay, President
Police Emergency Radio Services
Incorporated
82 Herbert Street
Framingham, MA 01701

Thomas J. Keller, Esq.
Vener, Lipfert, Berhard, McPherson and Hand, Chatered
Attorney for SEA Inc.
901 15th Street, N.W.
Suite 700
Washington, D.C. 20005-2301

Norma R. Shivley
Senior Project Engineer
SEA, Inc.
7030 220th Street, S.W.
Mountlake Terrace, WA 98043

Laura C. Mow
Counsel for SMR Advisory Group, L.C.
Hunter & Mow, P.C.
1620 I Street, N.W.
Suite 701
Washington, D.C. 20006

Alan R. Shark, President
AMERICAN MOBILE TELECOMMUNICATIONS ASSOCIATION, INC.
1150 18th Street, N.W.
Suite 250
Washington, D.C. 20036

Eliot J. Greenwald
Kevin M. Walsh
FISHER WAYLAND COOPER LEADER & ZARAGOZA, L.L.P.
2001 Pennsylvania Ave., N.W.
Suite 400
Washington, D.C. 20006

Jeffrey L. Sheldon
General Counsel
UTC, The Telecommuncations Association
1140 Connecticut Ave., N.W.
Suite 1140
Washington, D.C. 20036

Judith St. Ledger-Roty
Enrico C. Soriano
Paging Network, Inc.
REED SMITH SHAW & McCLAY
1301 K Street, N.W.
Suite 1100 - East Tower
Washington, D.C. 20005

David L. Hill
Audrey P. Rasmussen
PAGEMART OPERATIONS, INC.
O'Connor and Hannan, L.L.P.
1919 Pennsylvania Ave., N.W.
Suite 800
Washington, D.C. 20006

A. Thomas Carroccio
Counsel for Columbia Cellular Corporation
SANTARELLI, SMITH & CARROCCIO
1155 Connecticut Ave., N.W.
Washington, D.C. 20036-4306

ITS
2100 M Street, N.W.
Suite 140
Washington, D.C. 20037